Oliver Fricko

Research Scholar

Energy Program

International Institute for Applied Systems Analysis (IIASA)

2361 Laxenburg, Austria

Email: fricko@iiasa.ac.at

Tel.: +43 2236 807 225

ORCID: 0000-0002-6835-9883

# Summary

Oliver Fricko joined the Energy Program (ENE) at IIASA in 2012, as a Research Scholar.

He is one of the core developers of the MESSAGEix framework and a central modeler of IIASAs Energy Program, involved in numerous multi-model inter-comparison studies, including the Shared Socioeconomic Pathways (SSPs), the Energy Modelling Forum (EMF-30 and EMF-33) as well as projects funded by the European Commission (ADVANCE, CD-Links, ENGAGE).

Since joining IIASA, Mr. Fricko has established a soft-link between the Energy Programs core energy model (MESSAGE - 11 region global model) and IIASAs land-use model GLOBIOM. He has further contributed towards updating the existing linkage to IIASAs GAINS model to improve the representation of air-pollution. He has also enhanced the energy model to account for energy related water use and to incorporate short-term national policies, such as the Nationally Determined Contributions (NDCs), based on the Paris Agreement, in MESSAGE to better understand their implications on long-term climate mitigation scenarios. Most recently, Mr. Fricko has closely collaborated with NITI-Aayog (the National Institution for Transforming India) and with TERI-Universitry, in both cases to develop national energy models for India, based on the MESSAGEix.

# Core Competences and Experience

General: Medium- and long-term energy strategy development for cities (e.g. for Vienna, Salzburg and Wels in Austria) and countries (Austria, India).

Global model and scenario development for climate change and mitigation analysis.

Development of supply (e.g. crude oil and natural gas transport-infrastructure including pump- and compressor stations in Islamic Republic of Iran or district heating networks in the Ukraine) and demand (e.g. building renovation in cities) side energy efficiency strategies through use of scenario analysis.

Carrying out economic and ecologic energy strategy evaluations.

Physical energy security analysis for energy infrastructure components.

Portfolio-management and trade in the gas sector.

Experience with innovative & renewable energy forms (hydropower & pump-storage; wind power; solar- und photovoltaic; smart grids; energy self-sufficiency concepts; use of waste heat; bio-energy).

Conducting feasibility studies for business market entry concepts (e.g. retrofitting of CHP plants in Romania).

Modelling: Scenario development using the optimization model „MESSAGE“ - Model for Energy Supply Strategy Alternatives and their General Environmental Impacts (see: https://messageix.iiasa.ac.at/ for further information) as well as the simulation model „MAED“ - Model for Analysis of Energy Demand (see: <http://www.iaea.org/OurWork/ST/NE/Pess/PESSenergymodels.html> for more Information).

Expanding the energy model MESSAGE (11 region global model): to account for water requirements in the energy sector; soft linkage with the land-use model GLOBIOM (http://globiom.org/) and air pollution from GAINS (http://www.iiasa.ac.at/web/home/research/researchPrograms/air/GAINS.en.html); implementation of policies for analysis of the Intended Nationally Determined Commitments (INDCs)

Conceptualization and development of energy-cadastres e.g. for the visualization of the energy demand.

# Education

2005 Master of Arts in Management & International Business

Southampton Solent University, Southampton, United Kingdom

2002 Bachelors of Arts in International Business

Southampton Institute (Nottingham Trent University), Southampton, United Kingdom

# Professional Appointments

2012 – Present Research Scholar at IIASA, Energy Program, Laxenburg, Austria

2011 – 2013 Proprietor; Energy Consultant & Project Manager at ENZO-Energy Consulting Services e.U., Vienna, Austria

2008 – 2011 Energy Consultant at Fichtner IT Consulting AG, Berlin, Germany

2007 – 2008 Energy Consultant at IRM Consulting & Services GmbH, Vienna, Austria

2006 – 2007 Energy Consultant at IRM Integrated Resource Management GmbH, Vienna, Austria

# Selected (Research) Project Experience

Since 2016 CD-LINKS – Linking Climate and Development Policies – Leveraging International Networks and Knowledge Sharing, FP-7 funded research project, (http://www.cd-links.org/)

2015-2016 ADVANCE – Advanced Model and Validation for the Improved Analysis of Costs and Impacts in Mitigation Policies, FP-7 funded research project, (http://www.fp7-advance.eu/)

Since 2015 EMF-33 - Global Bio- Energy and Land Use

(https://emf.stanford.edu/events/emf-334-global-bio-energy-and-land-use)

Since 2015 EMF-30 - Short Lived Climate Forcers / Air Quality

(https://emf.stanford.edu/projects/emf-30-short-lived-climate-forcers-air-quality)

2013-2016 SSP - Shared Socioeconomic Pathways

(http://www.iiasa.ac.at/web/home/research/researchPrograms/Energy/SSP\_Scenario\_Database.html)

2010 Energy Infrastructure for the train of the future. *Forschungsförderungsgesellschaft (mbH); Energie der Zukunft*; Januar, 2010

2008 COUNTERACT - Cluster Of User Networks in Transport and Energy Relating to Anti-terrorist ACTivities, EC 5th FP funded project, (http://www.uitp.org/content/counteract-0)

2007 SUPWIND – Decision Support for Large Scale Integration of Wind Power, EC 6th FP funded project, (http://supwind.risoe.dk/)

# International experience – work carried out locally:

Europe: Austria, Germany, United Kingdom

Asia: Malaysia

# International projects carried out for customers located in:

Europe: Germany, Austria, Switzerland, United Kingdom

Eastern Europe: Ukraine, Romania

Middle East: Iran

Asia: Malaysia, India

# Customer Types:

* International utilities
* Municipal utilities
* Federal ministries, government agencies or public authorities
* Research institutes and universities
* Public transport companies
* European Union
* Private small and medium sized companies

# Publications

2019

* Harmsen M, **Fricko O**, Hilaire J, van Vuuren DP, Drouet L, Durand-Lasserve O, Fujimori S, Keramidas K, et al. (2019). Taking some heat off the NDCs? The limited potential of additional short-lived climate forcers’ mitigation. *Climatic Change* DOI:10.1007/s10584-019-02436-3. (In Press)
* Harmsen M, van Vuuren DP, Bodirsky B, Chateau J, Durand-Lasserve O, Drouet L, **Fricko O**, Fujimori S, et al. (2019). The role of methane in future climate strategies: mitigation potentials and climate impacts. *Climatic Change* DOI:10.1007/s10584-019-02437-2. (In Press)
* Fujimori S, Hasegawa T, Krey V, Riahi K, Bertram C, Bodirsky B, Bosetti V, Callen J, Després J, Doelman J, Drouet L, Emmerling J, Frank S, **Fricko O,** et al. (2019). A multi-model assessment of food security implications of climate change mitigation. *Nature Sustainability* 2 (5): 386-396. DOI:10.1038/s41893-019-0286-2.
* Gidden M, Riahi K, Smith S, Fujimori S, Luderer G, Kriegler E, van Vuuren DP, van den Berg M, Leyang F, Klein D, Calvin K, Doelman J, Frank S, **Fricko O**, et al. (2019). Global emissions pathways under different socioeconomic scenarios for use in CMIP6: a dataset of harmonized emissions trajectories through the end of the century. *Geoscientific Model Development Discussions* 12 (4): 1443-1475. DOI:10.5194/gmd-2018-266.
* Huppmann D, Gidden M**, Fricko O**, Kolp P, Orthofer C, Pimmer M, Kushin N, Vinca A, et al. (2019). The MESSAGEix Integrated Assessment Model and the ix modeling platform (ixmp). *Environmental Modelling & Software* 112: 143-156. DOI:10.1016/j.envsoft.2018.11.012.

2018

* Parkinson S, Krey V, Huppmann D, Kahil T, McCollum D, **Fricko O**, Byers E, Gidden M, et al. (2018). Balancing clean water-climate change mitigation tradeoffs. *Environmental Research Letters* 14 (1): e014009. DOI:10.1088/1748-9326/aaf2a3.
* Bauer N, Rose SK, Fujimori S, van Vuuren DP, Weyant J, Wise M, Cui Y, Daioglou V, Gidden M; Kato E; Kitous A; Leblanc F; Sands R; Sano F; Strefler J; Tsutsui J; Bibas R; **Fricko O**, et al. (2018). Global energy sector emission reductions and bioenergy use: overview of the bioenergy demand phase of the EMF-33 model comparison. *Climatic Change* DOI:10.1007/s10584-018-2226-y. (In Press)
* Luderer G, Vrontisi Z, Bertram C, Edelenbosch O, Pietzcker RC, Rogelj J, De Boer HS, Drouet L, Emmerling J, **Fricko O**, et al. (2018). Residual fossil CO2 emissions in 1.5–2°C pathways. *Nature Climate Change* 8 (7): 626-633. DOI:10.1038/s41558-018-0198-6.
* McCollum D, Zhou W, Bertram C, de Boer H-S, Bosetti V, Busch S, Despres J, Drouet L, Emmerling J, Fay M, **Fricko O**, et al. (2018). Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals. *Nature Energy* 3 (7): 589-599. DOI:10.1038/s41560-018-0179-z.
* Grubler A, Wilson C, Bento N, Boza-Kiss B, Krey V, McCollum D, Rao N, Riahi K, Rogelj J, De Stercke S, Cullen J, Frank S, **Fricko O**, et al. (2018). A low energy demand scenario for meeting the 1.5 °C target and sustainable development goals without negative emission technologies. *Nature Energy* 3 (6): 517-525. DOI:10.1038/s41560-018-0172-6.
* Vrontisi Z, Luderer G, Saveyn B, Keramidas K, Lara AR, Baumstark L, Bertram C, de Boer HS, Drouet L, Emmerling J, Fricko O, et al. (2018). Enhancing global climate policy ambition towards a 1.5 °C stabilization: a short-term multi-model assessment. *Environmental Research Letters* 13 (4): e044039. DOI:10.1088/1748-9326/aab53e.
* Rogelj J, Popp A, Calvin K, Luderer G, Emmerling J, Gernaat D, Fujimori S, Strefler J, Hasegawa T, Marangoni G, Krey V, Kriegler E, Riahi K, van Vuuren D, Doelman J, Drouet L, Edmonds J, **Fricko O**, et al. (2018). Scenarios towards limiting global mean temperature increase below 1.5 °C. *Nature Climate Change* 8 (4): 325-332. DOI:10.1038/s41558-018-0091-3.
* Thambi S, Bhatacharya A, & **Fricko O** (2018). India’s Energy and Emissions Outlook: Results from India Energy Model. NITI Aayog (National Institution for Transforming India)

2017

* Frank S, Havlik P, Soussana J-F, Levesque A, Valin H, Wollenberg E, Kleinwechter U, **Fricko O**, et al. (2017). Reducing greenhouse gas emissions in agriculture without compromising food security? *Environmental Research Letters 12 (10): e105004.* DOI:10.1088/1748-9326/aa8c83.
* Rao S, Klimont Z, Smith S, Van Dingenen R, Dentener F, Bouwman L, Riahi K, Amann M, Bodirsky B, van Vuuren DP, Reis LA, Calvin K, Drouet L, **Fricko O,** et al. (2017). Future Air Pollution in the Shared Socio-Economic Pathways. *Global Environmental Change 42: 346-358.* DOI: 10.1016/j.gloenvcha.2016.05.012
* Rogelj J, **Fricko O**, Meinshausen M, Krey V, Zilliacus JJJ, & Riahi K (2017). [Understanding the origin of Paris Agreement emission uncertainties.](http://pure.iiasa.ac.at/id/eprint/14631/) *Nature Communications 8: e15748.* DOI:10.1038/ncomms15748.
* **Fricko O**, Havlik P, Rogelj J, et al. (2017). The marker quantification of the shared socioeconomic pathway 2: a middle-of-the-road scenario for the 21st century. *Global Environmental Change 42: 251-267.* DOI: 10.1016/j.gloenvcha.2016.06.004
* Gambhir A, Drouet L, McCollum D, Napp T, Bernie D, Hawkes A, **Fricko O**, et al. (2017). Assessing the Feasibility of Global Long-Term Mitigation Scenarios. *Energies 10 (1): e89.* DOI: 10.3390/en10010089.
* Bauer, N., Calvin, K., Emmerling, J., **Fricko, O.**, et al. (2017) Shared Socio-Economic Pathways of the Energy Sector – Quantifying the Narratives*.* *Global Environmental Change 42: 316-330. DOI: http://dx.doi.org/10.1016/j.gloenvcha.2016.07.006*
* Marangoni G, Tavoni M, Bosetti V, Borgonovo E, Capros P, **Fricko O**, et al. (2017). Sensitivity of projected long-term CO2 emissions across the Shared Socioeconomic Pathways. *Nature Climate Change 7 (2): 113-117.* DOI:10.1038/nclimate3199.
* Popp, A., Calvin, K., Fujimori, S., Havlik, P., Humpenöder, F., Stehfest, E., Bodirsky, B.L., Dietrich, J.P., Doelmann, J.C., Gusti, M., Hasegawa, T., Kyle, P., Obersteiner, M., Tabeau, A., Takahashi, K., Valin, H., Waldhoff, S., Weindl, I., Wise, M., Kriegler, E., Lotze-Campen, H., **Fricko, O.**, Riahi, K. and van Vuuren, D.P. (2017) Land-use futures in the shared socio-economic pathways*.* *Global Environmental Change 42: 331-345., DOI:* [*http://dx.doi.org/10.1016/j.gloenvcha.2016.10.002*](http://dx.doi.org/10.1016/j.gloenvcha.2016.10.002)
* Riahi K, van Vuuren DP, Kriegler E, Edmonds J, O'Neill B, Fujimori S, Bauer N, Calvin K, Dellink R, **Fricko, O**, et al. (2017). The shared socioeconomic pathways and their energy, land use, and greenhouse gas emissions implications: An overview. *Global Environmental Change 42: 153-168*. DOI: 10.1016/j.gloenvcha.2016.05.009

2016

* Parkinson S, Johnson N, Rao N, Jones B, van Vliet M, **Fricko O**, et al. (2016). Climate and human development impacts on municipal water demand: A spatially-explicit global modeling framework, *Environmental Modelling & Software, 85. pp. 266-278*, DOI: 10.1016/j.envsoft.2016.08.002
* Nordström EM, Forsell N, Lundström A, Korosuo A, Bergh J, Havlík P, Kraxner F, Frank S, **Fricko O,** et al.(2016). Impacts of global climate change mitigation scenarios on forest management and harvesting in Sweden. *Canadian Journal of Forest Research*, DOI: 10.1139/cjfr-2016-0122
* Parkinson SC,  Djilali N,  Krey V,  **Fricko O**,  et al.  (2016).  Impacts of groundwater constraints on Saudi Arabia's low-carbon electricity supply strategy.  *Environmental Science and Technology*, DOI: 10.1021/acs.est.5b05852.
* **Fricko O**,  Parkinson SC,  Johnson N,  Strubegger M,  van Vliet MTH,  Riahi K  (2016).  Energy sector water use implications of a 2-degrees C climate policy.  *Environmental Research Letters, 11 (3). no.034011*, DOI: 10.1088/1748-9326/11/3/034011
* Jewell J, Vinichenko V, McCollum D, Bauer N, Riahi K, Aboumahboub T, **Fricko O**, et al. (2016). Energy independence and climate change mitigation, *Nature Energy, 1. no. 16073*, 10.1038/nenergy.2016.73

2015

* Kleinwechter U, Levesque A, Havlík P, Forsell F, Zhang YW, **Fricko O,** Obersteiner M., Global food efficiency of climate change mitigation in agriculture, *International Association of Agricultural Economists 2015 Conference, At August 9-14, 2015, Milan, Italy*
* Gambhir A, Napp T, Hawkes A, McCollum D, **Fricko O**, Havlik P, Riahi K, Drouet L, Bosetti V, Bernie D, Lowe J, Assessing the challenges of global long-term mitigation scenarios (C2a), *AVOID 2 WPCA VErsion 1.0, contract reference no. 1104872*, avoid.uk.net/2015/11/assessing-the-challenges-of-global-long-term-mitigation-scenarios-c2a/, 2012

2012

* **Fricko O**, Strubegger M, WIEN ENDBERICHT
* **Fricko O**, Strubegger M, (2012), Infrastructure development of the City of Wels. *Final Report for Elektrizitätswerke Wels AG*, March 2012

2011

* **Fricko O.**, Strubegger M, (2011), Energy efficient City – Stadt Freiburg – Increasing Energy Efficiency and Increasing CHP. *Final Report for Umweltschutzamt, Dezernat II, Freiburg im Breisgau*, Oktober 2011

2010

* **Fricko O**, Reuter A, Strubegger M, Pluy J, Auer H, (2010), Energy Infrastructure for the train of the future. *Forschungsförderungsgesellschaft (mbH); Energie der Zukunft*; Januar, 2010

2009

* **Fricko O**, Musilek O. (2009), Analysis of costs and benefits of different surveillance techniques & Assessment of the feasibility of available pipeline safety & security system. *Final Report: Safety and Security of Main Gas Transit Infrastructure*, EuropeAid 123286/C/SER/MULTI, 2009

2008

* **Fricko O**, Musilek O, Reuter A. (2008), A European Perspective on the Management of Threats to Critical Energy Infrastructure Components. *OSCE – Organization for Security and Co-Operation in Europe; Expert Meeting on Protecting Critical Energy Infrastructure from Terrorist Attacks*; Vienna; 17, July, 2008
* **Fricko O**, Basso G, Reuter A. (2008), Estimated Recovery Times for Energy Infrastructures Damaged by Terrorist Attacks. *Final Report in the Framework of the EU-Counteract project*. 29.02.2008.

2007

* Schrattenholzer L, **Fricko O**, Reuter A. (2007), Developing the Greater Mekong Subregion Energy Strategy. *Presentation at: ADB-BMF, WKO, OEKB Business Opportunities Seminar* – 5 November 2007, Vienna
* Bach B, Biermayer P, **Fricko O**, Haas R, Nakicenovic N, (2007), Strategy Process Energy 2050: Intermediate Phase of Research Program, *Federal Ministry for Transport, Innovation and Technology (BMVIT)*, Vienna, Austria, 2007

# Invited Talks

2016 Understanding the origin of Paris Agreement emission uncertainties, IAMC 2016, Beijing, China

2010 Energy Systems Planning – A Practical Application. *Guest-Lecture at the Technical University of Vienna, Masters Course in Energy Management* - June 2010

2009 Presentation at EUROGAS

2008 Presentation at COUNTERACT

# Research Leadership

2016 Supervisor - IIASA Young Scientists Summer Program (YSSP): Eveline Vasquez-Arroyo (Brazil), Optimization of the Brazilian energy system expansion under water availability restrictions: The Southeast Region case study (Part I)

2015 Supervisor - IIASA Young Scientists Summer Program (YSSP): Zarrar Khan (Pakistan), Integrating water and energy models for optimal long-term resource management

2014 Co-Supervisor - IIASA Young Scientists Summer Program (YSSP): Miho Kamei (Japan): Urban energy systems and their increasing importance in global long-term energy strategies

# Awards

2015 Outstanding Poster “energy sector adaptation in response to water scarcity” at the 2015 Annual IAMC Meeting

# Policy Engagement and Outreach

2010 Various stakeholder workshops for the City of Freiburg as part of the project Energy efficient City – Stadt Freiburg – Increasing Energy Efficiency and Increasing CHP

# Non-Academic Work.

2009 Certified project manager (IPMA Level C) Competences: "Shall be able to manage projects with limited complexity and/or to manage a sub-project of a complex project in all competence elements of project management."

2009 Certified project expert (IPMA Level D) Competences: "Shall have project management knowledge in all competence elements."

2009 Winning Complex Sales Contents: „WCS workshops are designed to help account teams analyze and improve their sales process in current opportunities.”

2008 ARIS Workshop Contents: Basics in Business Process Management (BPM) and utilization of ARIS tools

# Language Skills

German – Written/Spoken: Mother Tongue

English – Written/Spoken: Mother Tongue

French – Written/Spoken: Good

Croatian – Written/Spoken: Beginner

# IT-Skills

Microsoft Office (incl. Visio, Project); Python; R-Script; Postgre-SQL